

Plastic-Soil Bricks

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Abstract— There has been a considerable imbalance between the availability of conventional building materials and their demand in the recent past. Laterite quarry is abundantly available and the disposal of waste plastic (PET, PP etc) is a biggest challenge. In this work we are attempting to manufacture the bricks by using waste plastic in the range of 65% to 85% by weight of laterite soil and bitumen in the range of 4% to 12% by weight of soil. The bricks are with negligible water absorption and satisfactory compressive strength in comparison with normal bricks.

Key words: Laterite Quarry Waste, Waste Plastic (PET), Bitumen

I. INTRODUCTION

Have become an integral part in our daily life as a basic need. It produced on a massive scale worldwide and its production crosses the 150 million tonnes per year globally. Laterite soils in India are found in the Eastern Ghat of Orissa, the Southern parts of Western Ghat, Malabar Coastal plains and Ratnagiri of Maharashtra and some part of Andhra Pradesh, Tamil Nadu, Karnataka, Meghalaya, western part of West Bengal. Laterite soils are said to ferruginous aluminous rock. They are formed by decomposition; because of they are found in black soil regions having heavy rainfall. A molded rectangular block of clay baked by the sun or in a kiln until hard and used as a building and paving material is called as bricks. A rectangular block made of waste plastic, laterite soil and bitumen as the binding material is called as plastic soil brick.

II. MATERIALS AND METHOD

Property	Values
Specific gravity	2.56
Water content	6%
Liquid limit	41.3%
Plastic limit	29.4%
Shrinkage limit	14.2%
Bulk Density	1.85Kg/m ³

Property	1 st Class Brick	2 nd Class Brick	3 rd Class Brick	Plastic Soil Brick
Compressive Strength (N/mm ²)	10.51	7.0	3.0	6.56
Water Absorption (%)	<20%	<22%	<25%	2% -5%
Colour	Uniform Colour	Slightly Burnt Colour	Grey Colour	Brown Colour
Size & Shape	Regular Size	Slightly differ from std. size	Not of uniform size & shape	Slightly differ from std. size

Table: 4 Comparison Chart

Table 1: Properties of laterite quarry waste

Property	Values
Penetration	40mm
Ductility.	68.3cm
Softening point	58°C
Specific gravity	1.2

Table 2: Properties of Bitumen

III. EXPERIMENTAL PROCEDURE

A mould of size 20cmx10cmx10cm is prepared, 65%, 75% and 85% of plastic (PET, PP) by weight of soil is cleaned and heated to a molten state. Then sieved soil is added at intervals with proper mixing. At the final stage 4%, 8% and 12% of bitumen by weight of soil is added and mixed for uniform distribution to prepare 2 bricks. The hot mix is poured into the moulds and then compacted by vibration. The bricks are demoulded after 30 min and air dried for a period of 24hr for proper heat dissipation. Each mixed proportion bricks were prepared and tested for compressive strength in the universal testing machine (UTM). Bricks of different mix proportions are prepared, for each brick 2.19 kg of the laterite soil is added with varying bitumen content of 4%, 8% and 12% along with variation in percentage of plastic.

IV. RESULTS

Percentage of Plastic	Percentage of Bitumen	Compressive strength in (N/mm ²)
65%	4%	3.56 N/mm ²
	8%	4.15 N/mm ²
	12%	4.47 N/mm ²
75%	4%	5.18 N/mm ²
	8%	4.68 N/mm ²
	12%	5.67 N/mm ²
85%	4%	6.42 N/mm ²
	8%	4.69 N/mm ²
	12%	6.56 N/mm ²

Table 3: Compressive Strength

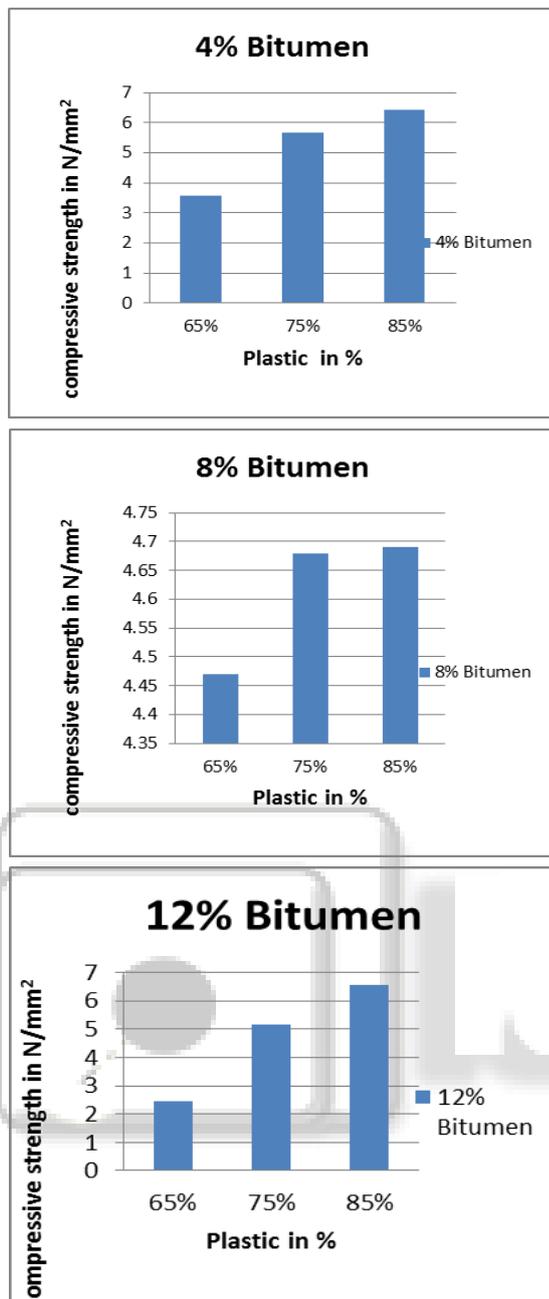


Fig. 1: Graphs

V. CONCLUSION

The tests were carried out for different percentage of bitumen for varying plastic content. From the obtained experimental results following conclusions are drawn.

- 1) The compressive strength increases with increase in plastic content.
- 2) With the maximum plastic and bitumen content the higher value of compressive strength is observed.
- 3) For 85% plastic 12% bitumen content the compressive strength increased to 6.56N/mm².
- 4) For different plastic contents with bitumen content 8% the compressive strength is decreased.
- 5) The maximum compressive strength obtained is 6.56 N/mm² which is nearly equal to the compressive strength of second class brick [7 N/mm²].

- 6) Plastic soil bricks can be used for construction of masonry walls where the faces are to be plastered and also used for construction of load bearing walls.
- 7) The efficient usage of waste plastic has resulted in effective usage of plastic waste and there by solve the problem of safe disposal. And utilization of quarry waste has reduced to some extent the problem of its disposal.
- 8) Plastic soil bricks are Eco friendly.

VI. SCOPE FOR FUTURE STUDY

- Soil can be reinforced with plastic fibres chopped from mineral water bottle.
- The plastic can be replaced by any other material like rubber, fly-ash, slag furnace, etc.

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